THE CAMBRIDGE STATISTICS DISCUSSION GROUP

Thursday 10th April 2025 7:15 for 7:45

Large Lecture Theatre,
MRC Cognition and Brain Sciences Unit,
Chaucer Road, Cambridge, CB2 7EF

Predicting recurrence of prostate cancer: a Bayesian approach

Roger Sewell

Abstract: We establish the extent to which predictions of recurrence of prostate cancer (relapse) taken using preoperative biomarkers could be improved upon using Bayesian methodology. We analyse the dataset of Shariat et al to compare the improvement in prediction of relapse times using biomarkers with models which omitthem. Using half the dataset for training and the other half for testing, predictions of relapse time by a Bayesian approach using a skew-Student mixture model are compared to those using the traditional Cox model. The predictions from the Bayesian model are found to outperform those of the Cox model but the overall yield of predictive information leaves plenty of scope for improvement in the range of biomarkers in use. The Bayesian model presented here is the first such model for prostate cancer to consider the variation of relapse hazard with biomarker concentrations to be smooth, as is intuitively believable. It is also the first model to be shown to provide improved quality of prediction over the Cox model and indeed the first to be shown to provide positive apparent Shannon information relative to an exponential prior.

Speaker: I spent the first 15 years of my working life as a hospital doctor specialising in renal medicine. I then worked for Cambridge Consultants for 18 years. During and after this time I have worked on a mixture of electronics design, signal processing, and inference, on a wide variety of projects whose common theme was measurement, in a broad sense. These have included measurement of particle size distribution in hydraulic oil, detection of explosives, survival modelling of electronic circuits and components and of patients with tuberculous meningitis, detection of inaudible watermarks in music, and the testing of medical drug delivery devices. I am now retired and during term supervise Trinity undergraduates in pure mathematics as a part-time retirement activity.

Directions: (From Central Cambridge) Chaucer Road is off Trumpington Road – if you are heading away from the city centre it is the first right after the junction with Brooklands Avenue. Number 15 is at the end on the left and is a large Victorian House with a more modern extension to its right. The entrance is in the porch located in the middle of the older section on the left as you come in and is accessed by ascending a few steps from the car park. Cars may be parked there. Note due to building work please enter and leave car park via the 'OUT' entrance (the second of the two entrances on the left as you go down Chaucer Road). The outside door will be locked at 7:45.
Arrivals after 7:45pm can gain admittance by contacting the secretary on 07761769436. A map showing the location of the unit is at http://www.mrc-cbu.cam.ac.uk/contact-us.

Provisional Next Meetings:
7th October - Florian Markowetz (Cancer Research UK Cambridge Institute) on
'All models are wrong and yours are useless: making clinical prediction models impactful for patients'.
3rd November – Sam Gilbert (Bennett Institute of Public Policy) on 'Benefits of data openness in a digital world'.
26th November – Riikka Hofmann (Faculty of Education) on '100 years of educational trials – no significant difference?'
3rd February 2026 – Nick Galwey (GlaxoSmithKline) on 'Connecting the False Discovery Rate to shrunk estimates'.

March – Mihaela van der Schaar (Cambridge Centre for AI in Medicine) on 'Revolutionising healthcare: AI-driven breakthroughs in medicine and healthcare delivery'.

Supper: Some members eat regularly in Wetherspoons (St Andrew's Street) before each meeting at **5-45pm**. Feel free to join them.

Subscriptions: of 1 pound are now due for attending the 2024-2025 session.

Secretary: Peter Watson, MRC Cognition and Brain Sciences Unit, 15 Chaucer Road, Cambridge CB2 7EF; telephone 01223 769479; E-mail peter.watson@mrc-cbu.cam.ac.uk.

Slides and .mp3 files of old talks: http://www.mrc-cbu.cam.ac.uk/people/peter.watson/csdg.html